PATENT ABSTRACTS OF JAPAN

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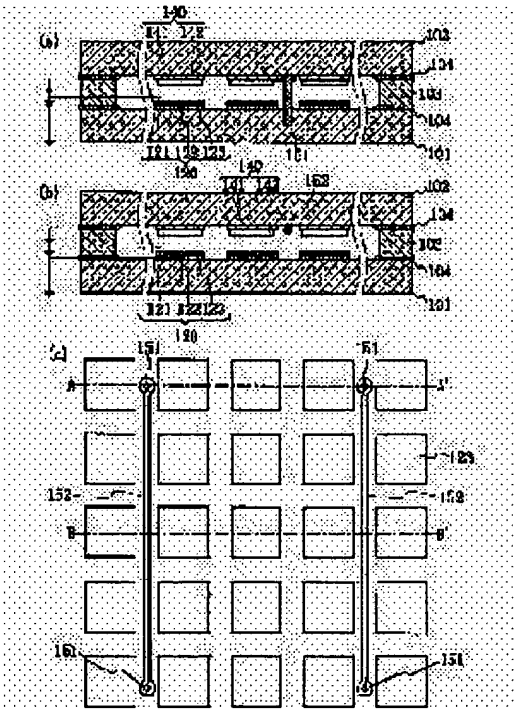
(54) FLAT DISPLAY

(57)Abstract:

PROBLEM TO BE SOLVED: To expand a displaying area of a flat display, of which the inner portion thereof is used in a vacuum state, without heavily much increasing its weight.

SOLUTION: In a flat display, a plurality of pins 151 with a diameter of 0.5 to 1.0 mm is arranged like a column and imbedded into a region of a glass substrate 101, where an electron emitting portion 120 is not formed. The tip of the pin 151 is in a state so that it reaches an inner surface of a front glass 102. Furthermore, there is provided a beam 152 with a diameter of 0.3 to 0.5 mm so as to lay two of the pins 151 across.



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成された表示画素を目視する平面型ディスプレイにおいて、第１の基板に下端が埋め込まれて上端が第２の基板の第１の基板に対向する面に到達して柱状に形成された金属製の複数のピンを備えるようにした。このように構成したので、第１の基板と第２の基板とがピンにより離間された状態を保持した状態となっている。この結果、この発明によれば、そのピンを、例えば、第１の基板中央部を含めて複数配置すれば、第１および第２の基板をあまり厚くしなくても、外圧による第１および第２の基板のたわみを抑制できる。従って、内部が真空状態で用いられる平面型ディスプレイを、その重量をあまり増加させることなく、表示面積が拡大できるようになる。

【図面の簡単な説明】

【図１】　この発明の実施の形態における平面型ディスプレイの一部構成を示す断面図（ａ），（ｂ）および平面図（ｃ）である。

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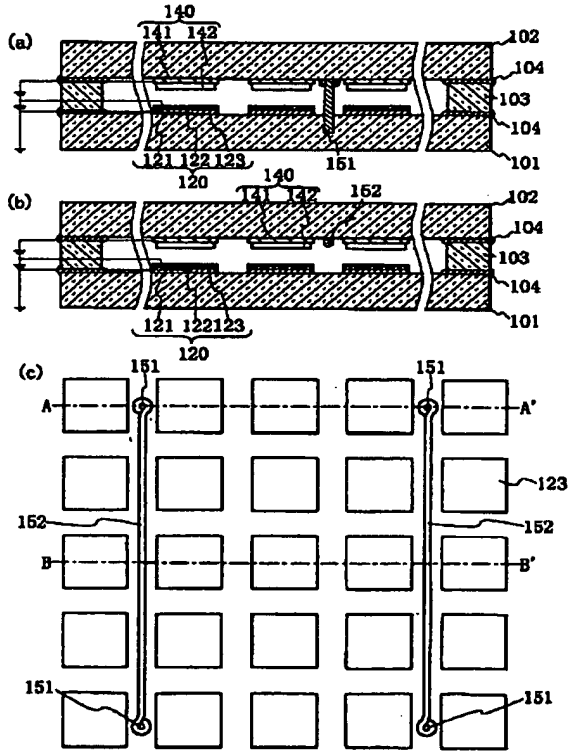
【図２】　この発明の実施の形態における他の例を説明するための断面図（ａ）および斜視図（ｂ）である。

【図３】　従来よりある平面型ディスプレイの一部構成を示す断面図（ａ）および斜視図（ｂ）である。

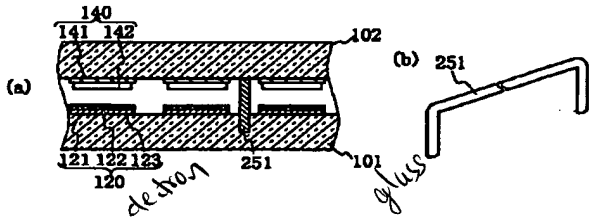
【符号の説明】

１０１…ガラス基板（第１の基板）、１０１ａ…凹部、１０２…フロントガラス（第２の基板）、１０２ａ…凹部、１０３…スペーサガラス、１０４…フリットガラス、１２０…電子放出部、１２１…基板電極、１２２…絶縁膜、１２３…電子放出電極、１４０…発光部、１４１…透明電極、１４２…蛍光体パターン、１５１…ピン、１５２…梁。

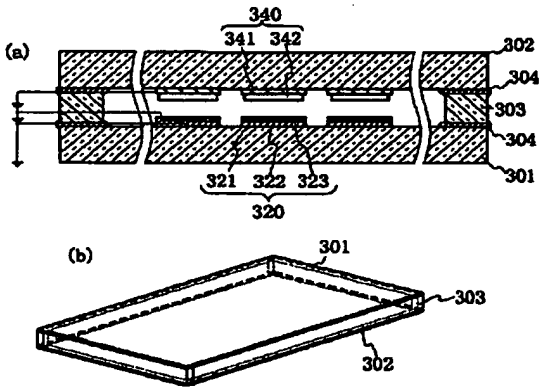
【図１】



【図２】



【図３】



* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the flat-surface mold display equipped with two or more display pixels arranged for example, in the shape of a two-dimensional matrix.
[0002]
[Description of the Prior Art] There is FED (Field Emission Display) as one gestalt of a flat-surface mold display. Hereafter, a certain FED is explained using drawing 3 from before. As for this FED, two or more formation of the electron emission section 320 is carried out on the glass substrate 301 at the shape of a matrix. This electron emission section consists of a substrate electrode 321 which consists of aluminum formed on the glass substrate 301, and an electron emission electrode 323 formed in about several nm through the insulator layer 322 formed thinly on this substrate electrode 321. Moreover, a glass substrate 301 is countered and the windshield 302 is arranged. And distance alienation of predetermined is carried out with the spacer glass 303 with which this glass substrate 301 and windshield 302 have been arranged in the shape of a frame in that perimeter.
[0003] Moreover, adhesion immobilization of the spacer glass 303 is carried out with the frit glass 304 of a low-melt point point at the glass substrate 301 and the windshield 302. And with a glass substrate 301, a windshield 302, and spacer glass 303, as shown in the perspective view of drawing 3 (b), the vacuum housing is formed in the configuration of a rectangular parallelepiped. The inside of this vacuum housing is the vacua of for example, 10-4Torr extent. Two or more light-emitting parts 340 are formed in windshield 302 front face in the vacuum housing at the shape of a matrix. This light-emitting part 340 consists of a transparent electrode 341 formed in windshield 302 front face, and a fluorescent substance pattern 342 formed on this. Moreover, the electron emission section 320 on a glass substrate 301 and the light-emitting part 340 by the side of a windshield 302 are in the condition of having met respectively and having been arranged.
[0004]
[Problem(s) to be Solved by the Invention] In the former, since it was constituted as mentioned above, when the screen product was expanded, about the thickness of a windshield or a glass substrate, and the width of face of spacer glass, the thing had to be carried out and there was a big problem that the weight of the whole equipment will increase. As mentioned above, in FED, the inside of a container is changed into the condition of a high vacuum. Therefore, between the glass substrate and the windshield, it is in the condition that the very bigger force than the exterior was impressed.
[0005] For this reason, if the screen product is made large, a deflection will occur, so that the board thickness of a windshield goes [that it is still thin and] to that center section for example, and a periphery will differ in spacing of a windshield and a glass substrate from a center section. Thus, if spacing differs in a display position, the problem of nonuniformity occurring in a display will arise. For this reason, in order to expand a screen product, he thickens board thickness of a glass substrate or a windshield, and was trying to prevent those deflections in the former. For this reason, the weight of equipment was increasing in the former.
[0006] This invention is made in order to cancel the above troubles, and it aims at enabling it to expand a screen product, without making that weight increase not much the flat-surface mold display on which the interior is used by the vacua.
[0007]
[Means for Solving the Problem] The flat-surface mold display of this invention is equipped with the vacuum housing which consists of the 2nd transparent substrate which countered the 1st substrate and this and has been arranged. In the flat-surface mold display which views the display pixel formed in the vacuum housing upwards through the 2nd

substrate It had the beam of the shape of a metal rod arranged over the upper bed of two or more metal pins which arrived at the field where a soffit is embedded [in] at the 1st substrate and an upper bed counters the 1st substrate of the 2nd substrate, and were formed in the shape of a column, and two pins. Thus, since it constituted, the condition that the 1st substrate and 2nd substrate were estranged is held with the spacer which consists of a pin and a beam. Moreover, the flat-surface mold display of invention is equipped with the vacuum housing which consists of the 2nd transparent substrate which countered the 1st substrate and this and has been arranged. It had two or more metal pins which arrived at the field where a soffit is embedded [in] at the 1st substrate and an upper bed counters the 1st substrate of the 2nd substrate in the flat-surface mold display which views the display pixel formed in the vacuum housing, and were formed in the shape of a column upwards through the 2nd substrate. Thus, since it constituted, the condition that the 1st substrate and 2nd substrate were estranged is held by the pin.

[0008]

[Embodiment of the Invention] The gestalt of implementation of this invention is explained with reference to drawing below. some flat-surface mold displays [in / in drawing 1 / the gestalt of implementation of this invention] -- it is the sectional view (a), (b), and the top view (c) showing a configuration. In addition, AA' cross section of drawing 1 (c) is drawing 1 (a), and BB' cross section of drawing 1 (c) is drawing 1 (b). Here, the configuration is explained taking the case of FED. As for this FED, two or more formation of the electron emission section 120 is carried out on the glass substrate (the 1st substrate) 101 at the shape of a matrix. This electron emission section 120 consists of a substrate electrode 121 which consists of aluminum formed on the glass substrate 101, and an electron emission electrode 123 formed in about several nm through the insulator layer 122 formed thinly on this substrate electrode 121.

[0009] In addition, the electron emission section is not restricted to those configurations. For example, you may make it use the field emission component of the Spindt mold by the gate electrode arranged with Spindt in the upper part as the electron emission section. Moreover, you may make it use a diamond top carbon thin film as the electron emission section. Moreover, you may make it use the pattern which carried out two or more arrangement of the carbon nanotube which consists of a layer of cylinder-like graphite as the electron emission section. That is, what is necessary is just to use for the electron emission section the component of the field emission mold used as FED.

[0010] Moreover, a glass substrate 101 is countered and the transparent windshield (the 2nd substrate) 102 is arranged. And distance alienation of predetermined is carried out with the spacer glass 103 with which this glass substrate 101 and windshield 102 have been arranged in the shape of a frame in that perimeter. Moreover, adhesion immobilization of the spacer glass 103 is carried out with the frit glass 104 of a low-melt point point at the glass substrate 101 and the windshield 102. And the vacuum housing is formed with a glass substrate 101, a windshield 102, and spacer glass 103.

[0011] Two or more light-emitting parts 140 are formed [the inner surface of a windshield 102] in the vacuum housing at the shape of a matrix. This light-emitting part 140 consists of a transparent electrode 141 formed in windshield 102 front face, and a fluorescent substance pattern 142 formed on this. Moreover, the electron emission section 120 on a glass substrate 101 and the light-emitting part 140 by the side of a windshield 102 are in the condition of having met respectively and having been arranged. 1 pixel consists of each the sections 120 and the light-emitting parts 140 of these electron emission with which it has countered, and the display on which the display pixel was arranged in the shape of a dot matrix consists of that two or more arrangement of them is carried out at the shape of a matrix.

[0012] And with the gestalt of this operation, two or more pins 151 with a diameter of 0.5-1.0mm were embedded to the field in which the electron emission section 120 of the field which counters the windshield 102 of a glass substrate 101 is not formed probably, and it has arranged in the shape of a column. Moreover, he is trying for the head of the pin 151 to reach the inner surface which counters the glass substrate 101 of a windshield 102. In addition, it had the beam 152 with a diameter of 0.3-0.5mm so that the two pins 151 might be passed. For example, 5050 alloys and 426 alloys should just be used for these pins 151 and a beam 152. The spacer by these two pins 151 and the beam 152 arranged over the meantime carries out predetermined-number arrangement to the field which does not become the hindrance of a display of a glass substrate 101.

[0013] Here, it is in the condition that atmospheric pressure joined the glass substrate 101 and the windshield 102 from the exterior because it is a vacua. However, the part where it is arranged can maintain spacing of a glass substrate 101 and a windshield 102 at the specified quantity with a pin 151 and the spacer by the beam 152, without bending. Here, at least a pin 151 can maintain spacing of a glass substrate 101 and a windshield 102 at the specified quantity, without bending. However, if there is no beam 152, only the point of a pin 151 will contact a windshield 102 and it will be in the condition of being easy to concentrate stress here.

[0014] In such the condition, a crack may go into a windshield 102 from the contact part of pin 151 point. This poses a problem, when a windshield 102 is comparatively thin. However, when a windshield 102 is comparatively thick, it seldom becomes a problem. Moreover, a pin is embedded in the field which counters the substrate of a windshield, and you may make it reach the inner surface to which the head counters the windshield of a substrate. If not glass but the ceramics etc. is used for a substrate at this time, the problem mentioned above will also be controlled.
[0015] However, it is better to have formed the beam 152, when making a windshield 102 thin. By forming a beam 152, it is because it will contact in respect of a windshield 102 and two or more points and the concentration to one point of stress can be avoided. And even if it expands the screen product of FED, it is not necessary to extend arrangement spacing of the spacer by the pin 151 or pin 151, and beam 152. Moreover, the spacer by the pin 151 or pin 151, and beam 152 is arranged also in the viewing-area center section of FED.
[0016] Therefore, according to the gestalt of this operation, since two or more pins 151 or pins 151, and spacers by the beam 152 were arranged in the viewing area in addition to spacer glass 103, even if it expands the viewing area of FED, even if it does not thicken board thickness of a windshield 102, the deflection of a windshield 102 can be prevented, for example. Moreover, since it was made to make a glass substrate 101 and a windshield 102 estrange with a pin 151 and two or more spacers twisted on a beam 152, the force concerning spacer glass 103 can also be decreased and they can also make thin width of face of spacer glass 103.
[0017] Here, when preparing a glass substrate 101, the pin 151 should just be embedded and arranged beforehand. For example, melting of the tabular glass is heated and carried out in the phase which prepares a glass substrate 101, in that condition, a pin is embedded at a position and arranged, and after this, if the glass plate which is carrying out heating fusion is cooled gradually, a pin can form beforehand the glass substrate embedded and arranged. Moreover, in this way, since a pin 151 is embedded at a glass substrate 101 and formed, they are in the condition currently fixed firmly. Therefore, the atmospheric pressure added between a glass substrate 101 and a windshield 102 can be enough borne with the spacer by the pin 151 or the pin 151, and the beam 152. Moreover, the pin 151 may be arranged so that it may run through a glass substrate 101.
[0018] By the way, in ****, although the metal spacer arranged in the viewing area between a glass substrate 101 and a windshield 102 was constituted from a pin 151 and a beam 152, it does not restrict to this. You may make it use the metal pin 251 which constituted them in one, as shown in drawing 2 (a) and (b). In addition, drawing 2 (a) shows the same cross section as drawing 1 (a), and drawing 2 (b) is the perspective view showing the metal pin 251. And what is necessary is just to also form this metal pin 251 in the diameter of about 0.5-1.0mm using 5050 alloys or 426 alloys, as mentioned above.
[0019] In addition, although the glass substrate was used, it does not restrict to this and you may make it use a ceramic substrate in ****. Moreover, in ****, although explained taking the case of FED, it does not restrict to this. It cannot be overemphasized that this invention is applicable also to the flat-surface mold display of other gestalten which perform the fluorescence display equipped with the electron emission section of a thermionic-emission mold which used the filament.
[0020] Moreover, in ****, although the group of two or more transparent electrodes (anode plate) and a fluorescent substance pattern, and the electron emission section was arranged in the shape of a matrix in one vacuum housing, it does not restrict to this. You may make it the big screen in which a dot-matrix display is possible constitute a flat display from having 1 set of anode plates and a fluorescent substance pattern, and the electron emission section in one vacuum housing, for example, arranging two or more the flat-surface mold displays (unit) in the shape of a matrix.
[0021] Thus, when two or more the units are arranged and it constitutes a big screen, and spacing of a glass substrate (the 1st substrate) and a transparent windshield (the 2nd substrate) varies in each unit, the brightness of 1 pixel which constitutes a big screen will vary. Here, as mentioned above, it becomes possible to make that spacing into homogeneity over two or more units by the beam of the shape of a metal rod arranged over the upper bed of two or more metal pins and these two pins, if it is made to make a glass substrate and a windshield estrange.
[0022]
[Effect of the Invention] As explained above, it has the vacuum housing which consists of the 2nd transparent substrate which countered the 1st substrate and this and has been arranged in this invention. In the flat-surface mold display which views the display pixel formed in the vacuum housing upwards through the 2nd substrate It had the beam of the shape of a metal rod arranged over the upper bed of two or more metal pins which arrived at the field where a soffit is embedded [in] at the 1st substrate and an upper bed counters the 1st substrate of the 2nd substrate, and were formed in the shape of a column, and two pins. Thus, since it constituted, the 1st substrate and 2nd substrate are in the condition of having held the condition of having been estranged by the spacer which consists of a pin and a

beam. Consequently, if two or more arrangement of these pins and the beam is carried out including the 1st substrate center section according to this invention, even if it does not thicken the 1st and 2nd substrates, the deflection of the 1st and 2nd substrates by external pressure can be controlled. Therefore, a screen product can be expanded, without the interior making the weight increase not much the flat-surface mold display used by the vacua.

[0023] Moreover, have the vacuum housing which consists of the 2nd transparent substrate which countered the 1st substrate and this and has been arranged in this invention, and it sets on the flat-surface mold display which views the display pixel formed in the vacuum housing upwards through that 2nd substrate. It had two or more metal pins which arrived at the field where a soffit is embedded [in] at the 1st substrate and an upper bed counters the 1st substrate of the 2nd substrate, and were formed in the shape of a column. Thus, since it constituted, the 1st substrate and 2nd substrate are in the condition of having held the condition of having been estranged by the pin. Consequently, if two or more arrangement of that pin is carried out including the 1st substrate center section according to this invention, even if it does not make the 1st and 2nd substrates not much thick, the deflection of the 1st and 2nd substrates by external pressure can be controlled. Therefore, a screen product can be expanded, without the interior making the weight increase not much the flat-surface mold display used by the vacua.

[Translation done.]